

IN THE SPECIFICATION

Please make the paragraph substitutions indicated below. The specific changes incorporated in the substitute paragraphs are shown in the following marked-up versions of the original paragraphs.

On page 1, amend the section beginning on line 6 as follows:

Related Applications ~~Invention~~

The present application ~~invention~~ is related to the following applications ~~invention~~ which are ~~are~~ [[is]] assigned to the same assignee as the present application ~~invention~~ ~~and which was filed on even date herewith:~~

Serial No. 10/006,292, entitled "Integrated Circuit Packages With Sandwiched Capacitors", now U.S. Patent No. 6,900,991; and

Serial No. ____/____, entitled "Electronic Assembly With Sandwiched Capacitors And Methods of Manufacture"

Serial No. 11/080,126, entitled "Integrated Circuit Packages With Sandwiched Capacitors".

On page 1, amend the section beginning on line 13 as follows:

Technical Field ~~of the Invention~~

The inventive subject matter ~~present invention~~ relates generally to electronic components. More particularly, the inventive subject matter ~~present invention~~ relates to a multi-terminal capacitor, to an electronic assembly that includes a multi-terminal capacitor, and to fabrication methods related thereto.

On page 1, line 19, amend the subtitle as follows:

Background Information ~~of the Invention~~

The paragraph beginning on page 4, line 3 is amended as follows:

FIG. 3 is a top view of a multi-terminal capacitor having separate terminals on three sides, in accordance with an embodiment of the inventive subject matter invention;

The paragraph beginning on page 4, line 8 is amended as follows:

FIG. 6 is a top view of a multi-terminal capacitor having separate terminals on four sides, in accordance with an embodiment of the inventive subject matter invention;

The paragraph beginning on page 4, line 13 is amended as follows:

FIG. 9 is a top view of a multi-terminal capacitor having separate terminals on six sides, in accordance with an embodiment of the inventive subject matter invention;

The five paragraphs beginning on page 4, line 18 are amended as follows:

FIG. 12 is a top view of a multi-terminal capacitor having separate terminals on at least three sides, in accordance with an embodiment of the inventive subject matter invention;

FIG. 13 illustrates a cross-sectional representation of an electronic assembly, including an electrical element, a multi-terminal capacitor having separate terminals on at least three sides, and a substrate, in accordance with an embodiment of the inventive subject matter invention;

FIGS. 14A and 14B together illustrate a flow diagram of a method of fabricating a multi-terminal capacitor having separate terminals on three or more sides, in accordance with an embodiment of the inventive subject matter invention;

FIGS. 15A and 15B together illustrate a flow diagram of a method of fabricating an electronic assembly comprising a substrate and a multi-terminal capacitor having separate terminals on three or more sides, in accordance with an embodiment of the inventive subject matter invention; and

FIGS. 16A, 16B, and 16C together illustrate a flow diagram of a method of fabricating an electronic assembly comprising a substrate, an electrical element, and a multi-terminal capacitor having separate terminals on three or more sides, in accordance with an embodiment of the inventive subject matter invention.

On page 5, line 6, amend the subtitle as follows:

~~Detailed Description of Embodiments of the Invention~~

The two paragraphs beginning on page 5, line 7 are amended as follows:

In the following detailed description of embodiments of the inventive subject matter ~~invention~~, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific preferred embodiments in which the inventive subject matter ~~inventions~~ may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice them ~~the invention~~, and it is to be understood that other embodiments may be utilized and that structural, mechanical, compositional, and electrical changes may be made without departing from the spirit and scope of the inventive subject matter ~~present inventions~~. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the inventive subject matter ~~present invention~~ is defined only by the appended claims.

The inventive subject matter ~~present invention~~ provides a multilayer capacitor that has separate terminals on at least three sides, and on as many as six sides. The capacitors can be fabricated in a large number of different configurations, types, and sizes, depending upon the target application.

The paragraph beginning on page 5, line 28 is amended as follows:

For an ~~[[one]]~~ application, used in a high performance electronic assembly as described in the Related Applications ~~Invention~~, the capacitors are positioned within the mounting region between a die and an IC package substrate, particularly in a core region containing power conductors. Through this arrangement, capacitors can be placed close to the IC to minimize loop inductance for power delivery, while also minimizing resistance losses. In addition, the use of ceramic capacitors between the IC and the IC package substrate in certain embodiments can provide an improved CTE (coefficient of thermal expansion) match and improved operational reliability.

The paragraph beginning on page 6, line 14 is amended as follows:

FIG. 3 is a top view of a multi-terminal capacitor 10 having separate terminals on three sides, in accordance with an embodiment of the inventive subject matter invention. Capacitor 10 has two terminals 12 of positive polarity and two terminals 14 of negative polarity on its upper surface. Terminals 12 and 14 are “separate” terminals as defined above.

The paragraph beginning on page 8, line 12 is amended as follows:

FIG. 6 is a top view of a multi-terminal capacitor 100 having separate terminals on four sides, in accordance with an embodiment of the inventive subject matter invention. Capacitor 100 has two terminals 112 of positive polarity and two terminals 114 of negative polarity on its top. Terminals 112 and 114 are “separate” terminals as defined above.

The paragraph beginning on page 10, line 10 is amended as follows:

FIG. 9 is a top view of a multi-terminal capacitor 200 having separate terminals on six sides, in accordance with an embodiment of the inventive subject matter invention. Capacitor 200 has two terminals 212 of positive polarity and two terminals 214 of negative polarity on its top. Terminals 212 and 214 are “separate” terminals as defined above.

The two paragraphs beginning on page 12, line 19 are amended as follows:

FIG. 12 is a top view of a multi-terminal capacitor 300 having separate terminals on at least three sides, in accordance with an embodiment of the inventive subject matter invention. On one surface, capacitor 300 has six terminals that include three terminals 305 of positive polarity and three terminals 307 of negative polarity. On a second surface, capacitor 300 has a separate terminal 301 of positive polarity, and on a third surface, capacitor 300 has a separate terminal 303 of negative polarity. Although the embodiment shown in FIG. 12 comprises terminals 301 and 303 on opposite sides of capacitor 300, in other embodiments the separate terminals could be on any side. Also, although capacitor 300 comprises terminals 301 and 303 having portions that wrap onto the same side as terminals 305 and 307, in another embodiments terminals 301 and 303 do not wrap onto the same side as other separate terminals. The internal structure of capacitor 300 can be similar to that shown for capacitor 100.

FIG. 13 illustrates a cross-sectional representation of an electronic assembly 400, including an electrical element 401, a multi-terminal capacitor 410 having separate terminals on at least three sides, and a substrate 430, in accordance with an embodiment of the inventive subject matter invention. Electronic assembly 400 illustrates merely one of many possible embodiments in which capacitors having separate terminals on three or more sides can be combined with a substrate, an electrical element, or both.

The paragraph beginning on page 16, line 8 is amended as follows:

FIGS. 14A and 14B together illustrate a flow diagram of a method of fabricating a multi-terminal capacitor having separate terminals on three or more sides, in accordance with an embodiment of the inventive subject matter invention. The method starts at 500.

The paragraph beginning on page 17, line 15 is amended as follows:

FIGS. 15A and 15B together illustrate a flow diagram of a method of fabricating an electronic assembly comprising a substrate and a multi-terminal capacitor having separate terminals on three or more sides, in accordance with an embodiment of the inventive subject matter invention. The method starts at 600.

The paragraph beginning on page 18, line 12 is amended as follows:

FIGS. 16A, 16B, and 16C together illustrate a flow diagram of a method of fabricating an electronic assembly comprising a substrate, an electrical element, and a multi-terminal capacitor having separate terminals on three or more sides, in accordance with an embodiment of the inventive subject matter invention. The method starts at 700.

The paragraph beginning on page 19, line 26 is amended as follows:

FIGS. 1-13 are merely representational and are not drawn to scale. Certain proportions thereof may be exaggerated, while others may be minimized. The drawings are intended to illustrate various implementations of the inventive subject matter invention that can be understood and appropriately carried out by those of ordinary skill in the art.

On page 20, line 1, please delete the subtitle "Conclusion".

The two paragraphs beginning on page 20, line 3 are amended as follows:

The inventive subject matter ~~present invention~~ provides for a multilayer capacitor that has separate terminals on at least three sides, and on as many as six sides. The capacitors can be fabricated in a large number of different configurations, types, and sizes, depending upon the desired end use application.

In ~~[[one]]~~ embodiments ~~embodiment~~, described in the Related Applications ~~Invention~~, the capacitors provide high-speed, low inductance capacitive decoupling in an integrated circuit (IC) package, in which the capacitors are positioned within the mounting region between a die and an IC package substrate.

The two paragraphs beginning on page 21, line 3 are amended as follows:

The inventive subject matter ~~present invention~~ allows electronic assemblies with high performance ICs to be operated at increased clock frequencies and with higher reliability. An electronic assembly and/or electronic system that incorporates one or more capacitors of the inventive subject matter ~~present invention~~ can handle the relatively high power densities and clock frequencies associated with high performance ICs, and such assemblies and/or systems are therefore more commercially attractive.

As shown herein, the inventive subject matter ~~present invention~~ can be implemented in a number of different embodiments, including various types of capacitors, an electronic assembly, and various methods of fabricating a capacitor and an electronic assembly. Other embodiments will be readily apparent to those of ordinary skill in the art. The elements, materials, geometries, dimensions, and sequence of operations can all be varied to suit particular manufacturing and packaging requirements.

The two paragraphs beginning on page 21, line 22 are amended as follows:

The inventive subject matter ~~present invention~~ is not to be construed as limited to use in IC packages, and it can be used with any other type of electronic package where the herein-described features of the inventive subject matter ~~present invention~~ provide an advantage.

Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement that is calculated to achieve the same purpose may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the inventive subject matter ~~present invention~~. Therefore, it is manifestly intended that this inventive subject matter ~~invention~~ be limited only by the claims and the equivalents thereof.